REMARKS

Applicants amendment of claim 23 is made to correct an antecedent basis error and not in response to the Examiners rejection of claim 23.

Applicants amendment of claim 24 is made to correct typographical error and not in response to the Examiners rejection of claim 24.

The Examiner rejected claims 20-22 under 35 U.S.C. §102(b) as being unpatentable over Anand et al. (US 4,559,696).

The Examiner rejected claims 23-24 and 26 under 35 U.S.C. 103(a) as being unpatentable over Anand et al. in view of Candelaria (US 5,360,986).

The Examiner rejected claims 25 under 35 U.S.C. 103(a) as being unpatentable over Anand et al. in view of Yamazaki (US PUB. 2002/0145167).

Applicants respectfully traverse the §102(b) and §103(a) rejections with the following arguments.

35 USC § 102

As to claim 20-22, the Examiner states that "Claims 20-22 are rejected under 35 U.S.C. 102(b) as being anticipated by Anand et al. (4,559,696). Anand discloses a bipolar transistor comprising: a collector (Fig. 3 cl.14); a base (el. 18); and a polysilicon emitter (el. 20) containing a dopant species and a polysilicon grain size modulating species (col. 4 lines 17-28), wherein Applicant discloses in instant specification that an ion implant of carbon will change the polysilicon grain size (p.7 line 17 - p.8 line 5) **[claim 20]**. Anand also discloses wherein said dopant species is arsenic (col. 4 lines 17-28) **[claim 21]**; and wherein said polysilicon grain size modulating species is selected from the group consisting of antimony and carbon (col. 4 lines 17-28) **[claim 22]**."

Applicants contend that claim 20 is not anticipated by Anand et al. because Anand et al. does not teach each and every feature of claim 20. For example Anand et al. does not teach "a *polysilicon* emitter." Applicants respectfully point out the emitter *region* 20 of Anand et al. is not polysilicon but comprises material identical to substrate 10 which one of ordinary skill in the art would know to be single-crystal silicon.

First, in col. 2, lines 19-21 Anand et al. teaches "The ions which are implanted are of a material which has a higher energy gap than that of the substrate material, e.g., silicon, into which they are implanted. Preferred materials include carbon and nitrogen." Applicants contend there was no such thing as a polysilicon substrate when as of the filing date (1983) of Anand et al, only single crystal silicon substrates also known as bulk silicon substrates.

Second, in col. 3 lines 56-60, Anand et al. teaches " In accordance with the present invention, ions of a material such as carbon or nitrogen are implanted into a region of the silicon substrate to produce a composite material having a higher energy gap than that of silicon." Then

in col. 4, lines 17-21, Anand et al. teaches "... the grading of the emitter region relative to be base region is carried out by implanting ions of a material such as carbon or nitrogen into the emitter region..." It is clear that the emitter of Anand is a region of the substrate.

Third, in col. 3, line 61 to col. 4, line 16 in reference to FIG. 3, Anand et al. teaches and describes a bipolar transistor that is well known in the art to be formed from single-crystal silicon, the collector 14, base 18 and emitter 20 being regions thereof and the emitter being single-crystal silicon not polysilicon.

Based on the preceding arguments, Applicants respectfully maintain that claim 20 is not unpatentable over Anand et al. and is in condition for allowance. Since claims 21-26 depend from claim 20, Applicants respectfully maintain that claims 21-26 are likewise in condition for allowance.

35 USC § 103 Rejections

As to claims 23-24 and 26, the Examiner states that "Claims 23-24 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Anand as applied to claim 20 above, and further in view of Candelaria (5,360,986). Anand does not disclose a higher or lower base current and a higher or lower emitter resistance using the grain size modulating species, or a specific ion implant dosage and energy. However, Anand would look to one such as Candelaria for improved device performance and higher emitter efficiency because Candelaria discloses wherein the base current of said bipolar transistor is higher or lower than the base current of an identical bipolar transistor fabricated without said polysilicon grain size modulating ion implantation step (col. 2 lines 58-66; col. 4 line 63 - col. 5 line 3); and wherein the resistance of said emitter of said bipolar transistor is higher or lower than the emitter resistance of an identical bipolar transistor fabricated without said polysilicon grain size modulating species ion implantation step (col. 2 lines 58-66; col. 4 line 63 - col. 5 line 3). Therefore, it would have been obvious to a person of ordinary skill in the art at the time."

As regards claims 23-24 and 26, Applicants contend that there is no reason to modify Anand et. al. with Candelaria, as Anand et al. already knows to use a carbon ion implant into the emitter to modify its bandgap and improve performance and therefore there is no basis for a 103(a) rejection based on Anand et al. in view of Candelaria.

Further regarding claims 23-24 and 26, Candelaria in col. 4, lines 63-65 teaches away from Anand et al. by stating "HBT 41 having narrowed bandgap base region 44 together with the wider bandgap collector and emitter regions 43 and 51 provide a bipolar transistor that has improved device performance." Applicants, respectfully point out, that Anand et al. teaches a

narrower emitter bandgap relative to the base bandgap which is the opposite of the wider emitter bandgap relative to the base bandgap of Candelaria.

Applicants contend that claim 24 is not obvious in view of Anand et al. in view of Candelaria because Anand et al. in view of Candelaria does not teach or suggest every feature of claim 24. For example, Anand et al. in view of Candelaria does not teach or suggest "wherein the resistance of said emitter of said bipolar transistor is higher or lower than the emitter resistance of an identical bipolar transistor fabricated without said polysilicon grain size modulating species."

Applicants, respectfully point out that Candelaria is teaching a carbon ion implantation into the base and not the emitter of a bipolar transistor. Candelaria states in col. 4, lines 53-54 "Narrowed bandgap base region 44 is a p-type epitaxial layer having carbon substitutionally incorporated..." There is no reason why Anand would "look to one such as Candelaria" for a teaching of the effect of carbon on a highly doped, n-type emitter implant based on a teaching in Candelaria of the effect a carbon on a lightly doped, p-type base.

Further, "higher or lower ... emitter resistance" as claimed by Applicants is not among the parameters named by Candelaria in col. 4 line 1 to col. 5, line 3, to wit "higher emitter efficiency, decreased base resistance, less emitter current crowding, wider frequency response and wider range of temperature." Therefore there is no teaching in Candelaria to look to.

Based on the preceding arguments, Applicants respectfully maintain that claim 24 is not unpatentable over Anand et al. in view of Candelaria and is in condition for allowance.

CONCLUSION

Based on the preceding arguments, Applicants respectfully believe that all pending claims and the entire application meet the acceptance criteria for allowance and therefore request favorable action. If Examiner believes that anything further would be helpful to place the application in better condition for allowance, Applicants invite the Examiner to contact the Applicants' representative at the telephone number listed below. The Director is hereby authorized to charge and/or credit Deposit Account 09-0456.

Respectfully submitted,
FOR: Geiss et al.

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